San Diego Municipal Code

Land Development Code

Landscape Standards

Printed on recycled paper

This information, or this document (or portions thereof), will be made available in alternative formats upon request.

LANDSCAPE STANDARDS AMENDMENTS

The following amendments have been incorporated into this posting of this plan:

Amendment	Date Effective Administratively	Date Adopted by City Council	Resolution Number
Landscape Standards Adopted.		11-18-97	R-289460
Revisions for Water Conservation and Related Items	11-27-09		
Water Conservation Amendments to Implement State Law and Minor Corrections			

TABLE OF CONTENTS

INTRODUCTION 1

SECTION I: PLANT MATERIALS GUIDELINES 2

1.1 LOCATIONAL CRITERIA 2
1.2 SCREENING CRITERIA 2
1.3 PLANT SELECTION CRITERIA 2
1.4 SITE PREPARATION CRITERIA 4
1.5 INSTALLATION CRITERIA 5
1.6 MAINTENANCE CRITERIA 5
1.7 STREETS RIGHTS-OF-WAY AND OPEN SPACES MATERIAL GUIDELINES 6
1.8 WATER FEATURES 8

SECTION II: IRRIGATION SYSTEMS 9

2.1 GENERAL REQUIREMENTS 9
2.2 TYPES OF SYSTEMS 10
2.3 DESIGN STANDARDS 12
2.4 INSTALLATION STANDARDS 19
2.5 STREET RIGHTS-OF-WAY AND OPEN SPACE IRRIGATION SYSTEMS 20
2.6 WATER BUDGET 23
2.7 LANDSCAPE IRRIGATION AUDIT 26

SECTION III: BRUSH MANAGEMENT 28

3-1 BRUSH MANAGEMENT – DESCRIPTION 28
3-2 BRUSH MANAGEMENT- REQUIREMENTS 28

SECTION IV: REVEGETATION AND EROSION CONTROL GUIDELINES ..... 29~~30~~

4.1 PERMANENT REVEGETATION ..... 29~~30~~
4.2 SLOPE REVEGETATION GUIDELINES ..... 30~~31~~
4.3 MULCHING PROCEDURES 31
4.4 HYDROSEEDING PROCEDURES ..... 31~~32~~
4.5 MAINTENANCE REQUIREMENTS 32

~~**SECTION V: STREET RIGHTS-OF-WAY AND OPEN SPACES ..... 32~~~~33~~**

SECTION V: STREET RIGHTS-OF-WAY AND OPEN SPACES 32

~~5.1 INTRODUCTION ..... 32~~~~33~~

5.1 INTRODUCTION 32

~~5.2 CENTER ISLAND LANDSCAPING ..... 3233~~
5.2 CENTER ISLAND LANDSCAPING 32
5.3 DEDICATED OPEN SPACE AREAS 33

LIST OF TABLES

TABLE 1 – Prohibited Species 3
TABLE 2 – Dedicated Landscape Water Meter Applicability 10
TABLE 3 – Acceptable Pipe Materials 15
TABLE 4 – Pipe Depths 19
~~TABLE 5 – Water Budget (MAWA) Applicability ..... 24~~
~~TABLE 6 – Evapotranspiration (ETo) Table By Community Planning Area ..... 25~~

Comment [a3j1]: Table is unnecessary and is proposed to be deleted.

Comment [a3j2]: This is already included in Appendix E and can be deleted.

LIST OF FIGURES

FIGURE 2-1 – Spray Diameter in Shrubs/Groundcover 17
FIGURE 2-2 – Spray Diameter in Turf Area 17
FIGURE 2-3 – Mainline & Lateral Piping Crossing Public Streets 22
FIGURE 3-1 – Pruning Trees to Provide Clearance For Brush Management 27

LIST OF APPENDICES

APPENDIX A - Reference Materials for Water-Conserving Plants and Irrigations Systems..... 33
APPENDIX B - Brush Management Implementation (to be added) 36
APPENDIX C - Improvements for Street Rights-of-Way and Open Space to be Maintained by the City 38
APPENDIX D - Approved Irrigation Materials List 43
APPENDIX E - Water Budget ~~Requirements~~ Landscape Worksheets.....49

INTRODUCTION

The Landscape Standards establish the minimum plant material, irrigation, brush management, and landscape related standards for work done in accordance with requirements of Land Development Code. They provide guidelines and alternative methods to meet regulations based on various site conditions. Additionally, the Landscape Standards provide the technical standards to create and maintain landscapes that conserve and efficiently use water. Applicants proposing landscape work should also obtain copies of the Submittal Requirements in the Land Development Manual. These establish the materials and information that must be submitted with an application for review by the City and establish applicable drafting standards for landscape drawings.

SECTION I: PLANT MATERIALS GUIDELINES

1.1 LOCATIONAL CRITERIA

The following general standards establish criteria for the location of all landscape improvements. Refer to **Section V** for additional restrictions and requirements governing landscape improvements in public rights-of-way.

1.1-1 Landscape improvements in all areas shall be located to permit the proper operation of irrigation systems and the effective use of mowers and other power equipment in lawn areas.

1.1-2 Plant locations and spacing shall permit normal plant development without undue crowding or trimming.

1.1-3 Plant materials are to be grouped into hydrozones with plant species having similar water demand and by their, soil, sun, and shade requirements. A hydrozone may mix plants of moderate and low water use or mix plants of high water use and moderate water use. If hydrozones contain mixed water use plants, the higher water use plant classification shall be used for the ~~estimated total water use~~ Estimated Total Water Use (ETWU) calculations (see Section 2.6-2.)

1.2 SCREENING CRITERIA

When plant materials, in conjunction with or in lieu of fencing, are used to satisfy the screening requirements established by the Land Development Code, the plantings shall be evergreen and spaced to ensure 100 percent screening within two years of installation.

1.3 PLANT SELECTION CRITERIA

1.3-1 General Guidelines
Plants shall be selected based on the water budget requirements in Section 2.6 – Water Budget ~~(Water Budget)~~. With regard to the Landscape Regulations, there are three general categories of plants: Preferred, Acceptable, and Prohibited.

1.3-1.01 Preferred plants are essentially those most suited to the actual site conditions. However, there are innumerable combinations of factors affecting the selection of appropriate plants. The water needs of a plant are, however, a critical factor. For the purposes of this document, preferred plants are water conserving plants which are easily maintained and have no known history of problems. **Appendix 'A'** is a list of reference materials which discuss and identify water conserving plants.

1.3-1.02 Acceptable plants are those which satisfy minimum performance standards for the special site area in question and are easily maintained. For example, to be acceptable for Brush Management Zone 2, the plant must meet the performance standards for that zone.

1.3-1.03 Prohibited plants are those which do not satisfy the minimum performance standards for the site area in question. In addition, there are a number of invasive species that are not allowed in any required landscape area. The use of these materials elsewhere on a site is strongly discouraged. Where existing, these plants shall be eradicated. **Table 1** contains a list of Prohibited Plants.

TABLE 1
PROHIBITED SPECIES

Botanical Name	Common Name
Ailanthus altissima	Tree-of-Heaven
Arundo donax	Giant Reed
Broussonetia papyrifera	Paper Mulberry
Cortaderia selloana	Pampas Grass
Nicotiana glauca	Tree Tobacco
Pennisetum setaceum	Fountain Grass
Spartium junceum	Spanish Broom
Tamarix spp	Tamarisk
Ricinus communis	Castor Bean

1.3-1.04 Plant material used for erosion control on disturbed soil areas and slopes should achieve 100 percent soil coverage within two years of being installed.

1.3-1.05 Palm tree sizes are based on brown trunk height using the following methods for measurement for the type of palm shown:

- Fan Palms - Measured from the ground line to the base of the first living frond.
- Feather Palms - Measured from the ground line to the base of the heart leaf where the heart leaf breaks away from the trunk.

1.3-1.06 Plant material used adjacent to coastal bluffs shall be native or naturalized to minimize the need for irrigation beyond initial plant establishment. Existing exotic and other plant materials that require regular irrigation should be removed and replaced with native or naturalized plant material.

1.3-1.07 Plant material are to be selected to be less than or equal to the ~~maximum applied water allowance~~ Maximum Applied Water Allowance (MAWA) as determined by the ~~water budget~~ Water Budget ~~formula~~ calculation and specifications in Section 2.3-13.10.

1.3-2 Lawns

1.3-2.01 Areas of lawn shall be minimized and concentrated where used

1.3-2.02 Lawn areas shall not exceed 10 percent of the planting area on a premises, excluding required common areas, active recreation areas, areas located within the public right-of-way between the curb and public sidewalk, and areas of turf used for bioretention and infiltration basins. This restriction does not apply to single dwelling unit residential uses in residential zones.

1.3-2.03 The minimum dimension of a lawn bounded by impervious surfaces on two or more sides is 8 feet in all directions unless subsurface or low volume irrigation is used (low pressure irrigation through tubing or lateral lines and low volume emitters such as drip lines or bubblers).

1.3-2.04 Lawn areas located on slopes, where the toe of slope is adjacent to hardscape (as defined in Section 113.0103 of the Land Development Code), shall not exceed a gradient of 25 percent (4:1).

1.3-3 Vehicular Use Areas Not Within Street Rights-of-Way

1.3-3.01 Landscape improvements, including, but not limited to, plants, berms, signs, and structures shall be selected, positioned, and maintained to avoid obstructing views of motorists near intersections of aisles, drives, and pedestrian walkways.

1.3-3.02 Trees shall be selected and maintained such that scaffold branches are a minimum of 60 inches above the finish grade as measured at the trunk.

1.3-3.03 Plant materials with known surface root problems shall not be used in vehicular use areas.

1.4 SITE PREPARATION CRITERIA

1.4-1 When so indicated on the approved landscape plans, soils testing by a certified agronomic soil testing laboratory and/or 24 hour percolation tests (see **Sec. 2.3-13.08**) shall be conducted and report recommendations implemented prior to the installation of plants and irrigation systems.

1.4-2 Certified soil test and percolation test results and any proposed construction document revisions shall be submitted to the City. Written approval of revised construction documents is required prior to the installation of plantings and irrigation systems.

1.4-3 Soil amendments are to be used when needed to improve water retention in the soil, to improve the functional structure of the soil for greater water infiltration and percolation, to balance pH, and to optimize plant growth.

1.5 INSTALLATION CRITERIA

1.5-1 All drainage shall comply with the Storm Water Standards of the Land Development Manual.

1.5-5.01 All planting areas shall be designed to effectively handle all drainage onsite.

1.5-5.02 Concentrated flows shall be handled on-site using low impact development practices.

1.5-2 Only trees which are not self-supporting shall be staked or guyed.

1.5-4 Herbaceous groundcovers shall be planted with triangular spacing at a distance that will typically ensure 100 percent coverage within one-year of installation.

1.5-5 For irrigated areas, the rate of seed application shall be sufficient to typically provide 100 percent coverage within six months of installation.

1.5-6 All required planting areas shall be covered with mulch (organic or inorganic) to a minimum depth of ~~2~~ 3 inches, excluding slopes requiring revegetation. All exposed soil areas without vegetation shall also be mulched to this minimum depth.

1.6 MAINTENANCE CRITERIA

1.6-1 Trees shall be watered deeply, but infrequently, to promote deeper rooting, and shall be fertilized as required by sound horticultural practices.

1.6-2 Plants shall be pruned in accordance with professional trimming standards to maintain their intended shapes and sizes, and to insure the health of the specimen and the safety of the public.

1.6-2 Tree guys and stake ties shall be inspected and adjusted periodically, and removed when necessary, to insure that they are adequately surrounding the tree without girdling trunks or branches.

1.6-4 Plants shall be pruned to avoid blocking walks, passageways and sight distance views for vehicular traffic.

1.6-5 Dead plants shall be replaced, damaged branches shall be removed, and overgrown areas shall be thinned by the selective removal of unnecessary plants.

1.6-6 Shrubs and vines used for screening trash enclosures and service areas shall be pruned to maximize screening while allowing access to the storage/service areas.

1.6-7 Shrubs, trees, and vines for screening adjacent properties shall be kept pruned so they do not interfere with pedestrian traffic and do not encroach excessively onto the adjacent property.

1.6-8 Trees shall be selected based upon the site characteristics including soil type, soil area, drainage, and adjacent improvements. Trees selected should grow to maturity without impacts to sidewalks, curbs, and other public improvements.

1.7 STREETS RIGHTS-OF-WAY AND OPEN SPACES MATERIAL GUIDELINES

All planting in street rights-of-way and those in open space areas that are to be maintained by the City, either directly or by administered contract shall comply with this section.

1.7-1 Plant Selection

1.7-1.01 In areas of existing development without an approved street tree plan[1], the tree selection(s) shall match the existing, permitted, predominate species unless the species is not listed in the Street Tree Selection Guide (www.sandiego.gov/street-div/pdf/treeguide.pdf).

1.7-1.02 In newly developing areas without an approved street tree plan, tree selection shall be coordinated to achieve continuity.

1.7-1.03 Plant selection shall be limited to those species which are considered relatively disease and pest-free and require minimal trimming to be maintained in a safe and attractive condition.

1.7-1.04 Substitutions of plant material in the street rights-of-way must be approved by the City Manager.

1.7-1.05 The planting of trees such as Cinnamomum, Ficus, Fraxinus, Schinus and other species with surface root systems that tend to damage sidewalks shall not typically be used in public rights-of-way. They will only be considered under appropriate site conditions and where maintenance responsibilities have been assigned to the satisfaction of the City Manager.

[1] Street tree plans, if adopted, are located in the applicable community plan. If there is no adopted street tree plan contact the City Arborist for the appropriate tree.

1.7-1.06 High water use plants, characterized by a plant factor of 0.7 to 1.0, are prohibited in street medians.

1.7-2 Installation Criteria

1.7-2.01 Per Section 1.4, Site Preparation Criteria, a soil percolation test shall be performed by filling a 12"x 12"x 12" square hole with water, waiting 12 hours, and then completely refilling. All percolation test operations shall be conducted in the presence of a licensed landscape architect, contractor, civil engineer or related professional. If all the water is not absorbed within 12 hours of the second filling, tree installations shall include the following:

- 150 cubic feet of topsoil to a maximum depth of three feet.
- A four-inch minimum diameter perforated drain line connected to a storm drain or sump. When connecting to a storm drain, a cleanout shall be installed at the connection to allow inspection of sources of non-storm water discharges caused by excessive irrigation.
- Sumps when approved, shall be a minimum 12 inches in diameter and extend four feet below the planting trench depth. A minimum three-inch diameter pipe with removal cap on top shall be extended to the surface for inspection.
- A subsurface irrigation system.

1.7-2.02 Non-biodegradable root barriers shall be installed around new trees in the public right-of-way to direct tree root growth downward and away from adjacent sidewalks, curbs, gutters, driveways, and other public improvements. Root barriers may be eliminated where the combination of tree species, soil type, soil area, and drainage conditions can be shown to afford equivalent protection against tree root damage to public improvements.

1.7-3 Maintenance Criteria

1.7-3.01 Trees with a low spreading branch structure shall typically not be used in the street rights-of-way, and individual specimens shall be selected, planted, and pruned, if necessary, such that major scaffold branches are at least 8 feet above the finish surface or finish grade, as measured at the trunk.

1.7-3.02 Trees shall be positioned and kept maintained so that any branches that extend out over dedicated street rights-of-way have a minimum of 14 feet 6 inches of clearance above the surface of the street.

1.7-4 Public Improvements Adjacent to Existing Trees

1.7-4.01 Sidewalk, curb, gutter or driveway renovation or replacement within four feet of an existing tree shall be performed following procedures that would protect the existing tree. These procedures could include root pruning, modification to the alignment of the proposed public improvement, erecting temporary barriers during construction, or modification to the construction detail of the improvement. Where the combination of existing conditions and the proposed public improvement would preclude tree preservation, trees that are removed should be replaced with new street trees.

1.7-4.02 Public improvement work adjacent to existing trees shall be performed in accordance with the provisions of the public right-of-way permit.

1.8 WATER FEATURES

1.8-1 Manmade water features including pools, spas, ponds, lakes, waterfalls, fountains, artificial streams and similar features where water is artificially supplied are subject to the regulations for high water use landscape features.

1.8-2 Recirculating water systems shall be used as a source for water features.

1.8-3 Where available, recycled water shall be used as a source for manmade water features.

1.8-4 Constructed wetlands that are non-irrigated and that are used for on-site wastewater treatment or stormwater best management practices are not water features and are not subject to the water budget calculation in Section 2.6.

SECTION II: IRRIGATION SYSTEMS

2.1 GENERAL REQUIREMENTS

Irrigation systems shall be designed, constructed, and managed to maximize overall irrigation efficiency within the limits established by the ~~maximum applied water allowance~~ Water Budget - Maximum Applied Water Allowance (MAWA). The following standards establish the minimum requirements for irrigation systems.

2.1-1 The minimum design, installation and maintenance criteria herein shall not be considered as specifications.

2.1-2 Material or processes other than those indicated herein may be used if sufficient data is presented to show that the material or process is equivalent or better in performance and intent, and meets or exceeds all design and performance tests with all equivalent features.

2.1-3 All required irrigation systems and all irrigated areas shall be automatically controlled. Temporary systems may be an exception.

2.1-4 All required irrigation systems shall be maintained in working condition as approved. Any equipment or material needing replacement is to be replaced immediately with equipment or material of the same type and performance standards as the originally approved irrigation system.

2.1-5 Irrigation systems (valve systems, piping and pressure regulators) shall be designed to deliver water to hydrozones based on the moisture requirements of the plant grouping.

2.1-~~5~~6 Water meters. Dedicated (separate) landscape water meters shall be installed for all new development as listed in Table 2 prior to occupancy or final inspection approval.

2.1-~~6~~7 Submeters. A landscape irrigation submeter shall be installed for development as listed in Table 2 prior to a certificate of occupancy or final inspection approval.

TABLE 2
LANDSCAPE WATER METER
APPLICABILITY

Type of Water Meter	Type of Development Proposal	Landscape Area[2] Threshold
Dedicated Landscape Irrigation Meter	New development (excluding single dwelling unit development and commercial production of crops and livestock)	~~5,000~~ 1,000 s.f. and greater
Landscape ~~irrigation~~ Irrigation Submeter	New single-dwelling unit development	All
	Improvements to the following existing development, that do not have a dedicated landscape irrigation meter, that require a building permit and landscape review consistent with Section 142.0402: • Multiple-dwelling units development - common landscape area only • Commercial • Industrial	1,000 s.f. and greater

2.2 TYPES OF SYSTEMS

2.2-1 Temporary Systems

Temporary systems shall operate for a period sufficient to establish plant material and to provide vegetative cover that prevents soil erosion. The amount of irrigation must be adjusted when warranted by site conditions.

2.2-2 On-Grade Systems

2.2-2.01 On-grade piping shall not be allowed where subject to adjacent pedestrian traffic or vandalism.

2.2-2.02 On-grade piping is allowed for temporary systems and irrigation in the brush management zones.

[2] For purposes of this calculation the landscape area means the entire premises less the area of building footprints, non-irrigated portions of parking lots, driveways, hardscapes (as defined in §113.0103 of the Land Development Code), and areas designated for habitat preservation or brush management Zone 2.

2.2-2.03 Permanent on-grade systems in brush management zones shall utilize metal pipe and fittings. Irrigation heads and nozzles may be plastic.

2.2-2.04 Selective watering of introduced native materials in native areas, irrigation of highly erosive or extremely rocky soils, and areas where trenching would disturb or loosen unstable material may be approved for on-grade installation by the City Manager.

2.2-2.05 All on-grade lines shall be secured to slopes every 10 feet. The ends of all laterals shall also be staked. Stakes shall be installed so as not to create a safety hazard.

2.2-3 Spray Systems

2.2-3.01 Spray heads of different manufacturers or of different basic types (bubbler, stream, standard, low gallonage, impact, etc.) shall have consistent operating characteristics on any single lateral circuit.

2.2-3.02 Spray heads on the same lateral circuit shall be balanced for matched precipitation rates within five percent from the average for any different arcs of coverage or operating radii.

2.2-3.03 Specially designed, adjustable nozzles shall be used for odd shaped areas, while still maintaining even application rates.

2.2-4 Drip Systems

2.2-4.01 All components shall be of non-corrosive materials.

2.2-4.02 Except for temporary installations, all lateral piping shall be installed below the finish grade of the planting area. Emitter distribution tubing (downstream of emitters) may be installed on finish grade if covered by mulch.

2.2-4.03 System equipment shall be installed below grade in locking access sleeves or meter boxes.

2.2-4.04 Drip tubing systems with embedded, factory installed, or integral bi-wall small orifice type emitters shall be designed such that there is a maximum emission rate differential of no more than five percent along the entire length of tubing.

2.2-4.05 The design of drip systems shall provide balanced water supply to plant materials of different sizes irrigated by a common lateral line.

2.2-4.06 All drip systems shall be adequately filtered and regulated per the manufacturer's recommended specifications.

2.2-4.07 All systems shall be capable of flushing out accumulated particulate matter. System designs shall provide a means for servicing such flushing requirements with a minimum of erosion or disruption to the surrounding landscape.

2.2-4.08 Pressure gauges shall be included in the design at critical points such as filtration equipment, fertilization equipment, regulators, or pressure compensating valves.

2.2-4.9 Systems shall be designed for the mature size of plant material to be irrigated, including the eventual rooting pattern of the planting. A minimum of 50 percent of the root structure of the plant material is to be irrigated at all stages of growth, up to and including full mature size. All necessary equipment for mature plant size irrigation shall be installed initially. Future outlets for tubing shall be capped or otherwise sealed until needed.

2.2-4.10 Emitters shall be protected from soil or root incursion and easily accessible. Metal rods may be required at emitters for easy location with a metal detector.

2.2-5 Special Systems

Special systems shall be allowed at the discretion of the City Manager.

2.3 DESIGN STANDARDS

2.3-1 Water Supply

Water supply shall be clean, free of suspended particles, algae, or chemicals that may form insoluble precipitates in the equipment or may be detrimental to plantings.

2.3-2 Water Service

2.3-2.01 Individually assessed areas and lots that will be individually owned shall have separately metered and controlled irrigation systems. Irrigation shall be confined to the individual areas without overspray onto adjacent areas or across property lines.

2.3-2.02 City approved backflow prevention units are required on all irrigation systems. Installation shall comply with all applicable health and safety codes.

2.3-3 Electrical Service

Electrical service point of connection for the irrigation system controllers shall be indicated and referenced on the irrigation plans.

2.3-4 Scheduling and Circuiting

2.3-4.01 Each circuit shall be capable of meeting the minimum needs of the mature plant material during peak demands within a weekly irrigation schedule.

- All irrigation systems shall include a weather-based or soil moisture-based irrigation controller.
- Overhead irrigation shall be scheduled between 8:00 p.m. and 10:00 a.m. unless weather conditions prevent.

2.3-4.02 Lateral systems shall be divided by exposure (sun vs. shade, etc.), elevation, and by type of irrigation application equipment (drip, spray, etc.).

2.3-4.03 Where the plant material has differing watering needs, such as very low, low, medium, and high water use plants, separate systems shall be designed to give each plant-type area adequate minimum amounts of water. Where feasible, trees shall be placed on separate valves from shrubs, groundcovers, and lawns.

2.3-5 Control Systems

2.3-5.01 Automatic control systems shall accommodate all aspects of the design, including multiple schedules, repeat cycles, and moisture sensing and rain sensing override devices (or weather based adjustment) as required.

2.3-5.02 Control mechanisms for moisture-sensing systems shall be accommodated within the controller enclosure.

2.3-5.03 Controller units shall be enclosed in secure, weather and vandal resistant, locking housings manufactured expressly for that purpose or located within a structure. Controller cabinets shall not be installed within an irrigation spray pattern.

2.3-6 Valves

2.3-6.01 Emergency Shutoff Valves

- Globe or ball valves shall be provided at points of connection and loop or zone isolation points.
- For manifold remote control valves, the globe or ball valve shall equal the size of the largest control valve in the manifold.

- For all slope areas, globe or ball valves shall be located on the main line upstream from the control valves and adjacent to the slope area. Valve box lids shall be marked "Emergency Shutoff."

- Main line flow sensors ~~should~~ shall be installed ~~as necessary~~ to prevent irrigation runoff resulting from system damage, broken irrigation lines, or faulty valves. Residential landscape areas less than 5,000 square feet are exempt.

2.3-6.02 Zone Control Valves

- Globe or ball valves shall be installed to divide the irrigation system into controllable units, and to avoid draining long runs of piping for system repairs.

- Globe or ball valves shall isolate all looped portions of mainline networks.

2.3-6.03 Remote Control Valves

- Control valves shall be manifold where feasible, and installed in individual valve boxes.

- Valves shall be of slow closing design, and automatically close in the event of power failure.

- Valves shall be sized to provide adequate pressure differential for proper operation.

2.3-6.04 Quick Coupling Valves/Hose Bibs

Quick coupler valves or hose bibs shall be spaced at 100-foot intervals, maximum, and as needed to logically service areas.

2.3-6.05 Special Valves

- Anti-drain valves shall be installed on all irrigation systems without integral check valves on any areas where the cross-slope gradient of the lateral system exceeds ten feet. If any portion of the lateral system requires anti-drain valves, the lateral system shall be designed to maintain consistent operating pressures.

- Excess flow shutoff valves shall be installed with all irrigation spray heads located at the top of permanently revegetated slopes and within two feet of a public sidewalk.

2.3-7 Piping Only

The materials in Table 3 may be used for required landscape irrigation systems.

TABLE 3
ACCEPTABLE PIPE MATERIALS

LOCATION	USE	MATERIAL	TYPE	NOTES
Below Grade	Pressure Mains	Copper	Type "L"	Any Size
		P.V.C.	Class 315	2"
		P.V.C.	Sch. 40	1-1/2"
		Red Brass		Threaded
	Lateral Lines	Copper	Type "L"	Any Size
		* Galvanized Iron	Sch. 40	Threaded
		Polyethylene	Uv-resistant	Drip Systems
		P.V.C.	Class 315	1/2"
		P.V.C.	Class 200	3/4"
		P.V.C.	Sch. 40	Any Size
		Red Brass		Threaded
	Fittings	Cast Iron	Class 250	Short Body
		Copper	Type "L"	Any Size
		* Galvanized Iron	Sch.40	Threaded
		Nylon or A.B.S.	Specialty	Drip Systems
		P.V.C.	Sch.40	Any Size
		Red Brass		Threaded
Above Grade	Pressure Mains	* Copper	Type 'L'	Any Size
		* Galvanized Iron	Sch. 40	Threaded
		* Red Brass		Threaded
	Lateral Lines	Copper	Type "L"	Any Size
		Galvanized Iron	Sch. 40	Threaded
		Polyethylene	Uv-resistant	Drip Systems Mulch Required
		* P.V.C.	Uvr-sch. 40	Any Size
		* P.V.C.	Class 315	2"
		* P.V.C.	Sch. 40	<2"
	Fittings	Copper	Type "L"	Any Size
		Galvanized Iron	Sch. 40	Any Size
		Molded Plastic	Uv-resistant	Drip Systems
Above Grade	Fittings	* P.V.C.	Uvr-sch. 40	Any Size
		* P.V.C.	Sch. 40	Any Size
		Red Brass		Threaded

* Temporary Systems Only.

2.3-8 Runoff and Overspray

All irrigation systems shall be designed to avoid runoff, seepage, and overspray onto adjacent property, non-irrigated areas, walks, roadways, or structures. Systems requiring flushing shall accommodate flushing without erosion, disturbance to planting areas, or discharge into the storm drain system

2.3-9 Pressure Constraints

2.3-9.01 Irrigation systems shall be designed to operate correctly at the lowest available operational pressure expected during the year and shall withstand water system surges.

2.3-9.02 Pressure differential within lateral piping circuits shall not exceed 20 percent of the designed operating pressure of the equipment on that circuit.

2.3-9.03 Pressure regulating devices shall be installed on any systems with a static inlet pressure at the point of connection greater than 80 psi unless specifically approved by the City Manager. Pressure shall be regulated to a pressure adequate to operate the equipment at designed pressures with all incidental and line losses included.

2.3-9.04 Where the pressure within the system exceeds 80 psi (due to elevation drops, etc.), a pressure reducing valve shall be used to reduce pressure to design levels.

2.3-10 Velocity Constraints

Irrigation system piping shall be sized such that velocities remain below five feet per second.

2.3-11 Coverage

2.3-11.01 Spray heads in turf areas and all stream, strip or square spray type heads shall be spaced 50 percent of the maximum rated diameter of coverage (Figure 2-2).

FIGURE 2-1
SPRAY DIAMETER IN
SHRUBS/GROUNDCOVER

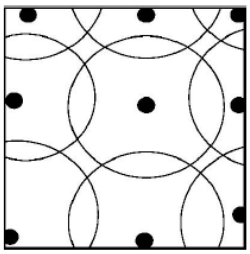
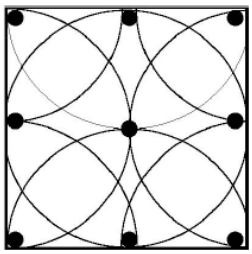


FIGURE 2-2
SPRAY DIAMETER IN
TURF AREA



2.3-11.02 Only low volume irrigation or subsurface irrigation shall be used to irrigate turf areas that are within 24 inches of an impermeable surface unless the surface is constructed to allow the water to drain entirely into a landscaped area.

2.3-12 Equipment Protection

2.3-12.01 Any irrigation equipment located within 12 inches of pedestrian and vehicular use areas shall be located entirely below grade or otherwise adequately protected from potential damage.

2.3-12.02 All heads located within 12 inches of pedestrian and vehicular use areas shall be pop-up type.

2.3-12.03 Pop-up heads shall be installed with swing joints or other flexible assembly.

2.3-12.04 In-line wire splices shall be made only in pull boxes, with waterproof sealing packets.

2.3-12.05 Swing joints shall be installed in lines at all abrupt changes of grade.

2.3-13 Water Conservation Performance Standards and Requirements

The following standards apply to all projects for which landscaping is required and to special landscape situations such as slopes, fire hazard areas, and transitional landscapes:

2.3-13.01 For all areas, the water delivery rate of the irrigation system shall be matched to the slope gradient and the percolation rate of soil.

2.3-13.02 Slopes with a gradient of 3:1 or steeper and greater than 6 feet in height that are irrigated with an overhead spray system must have a precipitation rate no greater than 0.65 inches per hour.

2.3-13.03 The irrigation system shall deliver water efficiently and uniformly and shall be appropriate to the needs of the plant materials. Recommended reference materials for irrigation systems design are listed in **Appendix "A"**.

2.3-13.04 Over watering as evidenced by soggy soils, continually wet pavement, standing water, runoff in street gutters and other similar conditions shall be prevented.

2.3-13.05 All devices such as tensiometers, moisture sensors and rain sensing devices are subject to City approval.

2.3-13.06 Moisture sensors shall be installed per manufacturer's recommendations.

2.3-13.07 All automatic irrigation controllers and moisture sensing systems shall be adjusted seasonally and as weather and plant conditions warrant.

2.3-13.08 Twenty-four hour pressure recording information and the date of the recording shall be indicated on the irrigation plans.

2.3-13.09 When the pressure reading is either less than 40 psi, more than 5 years old or is not available, the pressure shall be calculated from the hydraulic grade line zone (contact Water Utilities) and the site elevation. The calculated pressure, meter elevation and hydraulic gradient shall be indicated on the plans.

2.3-13.10 When the actual measured or calculated minimum pressure is below 40 psi, irrigation systems, except for drip and other low flow systems, shall include compensating design or equipment modifications.

2.3-13.11 New development, in areas where reclaimed water is available and suitable for irrigation, shall provide a separate water distribution system so that only reclaimed water is used for irrigation.

2.3-13-12 Systems requiring flushing shall accommodate flushing without discharge into the storm drain system.

2.3-13.13 Alternative irrigation systems that may be used to augment water for landscape purposes include:

- Graywater systems may be used when installed consistent with the Department of Water Resources Graywater Guide and upon permit approval and inspection by San Diego County Department of Environmental Health.

- Rain water harvesting may be used to augment irrigation systems provided that the systems used to harvest and store the water are designed to prevent intrusion of trash, insects, and animals.

2.4 INSTALLATION STANDARDS

2.4-1 Trench Widths

Trenches for irrigation pressure lines shall be excavated wide enough to allow a minimum of four inches between parallel pipe lines and eight inches from lines of other trades. Lines shall not be installed parallel and directly over one another. Maintain three inches vertical clearance between crossing irrigation lines; minimum transverse angle is 45 degrees.

2.4-2 Pipe Depths

TABLE 4
PIPE DEPTHS

LINE TYPE	LOCATION	SIZE	DEPTH	ZONE		
				COM	IND	RES
Pressure Main	Within Landscape	<3" I.D.	18 inches	•	•	•
		3" I.D.	24 inches	•	•	•
		4" I.D.	30 inches	•	•	•
Pressure Main	Under Vehicular Paving	<3" I.D.	30 inches			•
		<3" I.D.	36 inches	•	•	
		3" I.D.	36 inches	•	•	•
Non-Pressure Lateral	Within Landscape	<3" I.D.	12 inches	•	•	
		3" I.D.	18 inches	•	•	
Non-Pressure Lateral	Under Vehicular Paving	<3" I.D.	24 inches			•
Non-Pressure Lateral	Under Vehicular Paving	<3" I.D.	30 inches	•	•	
		3" I.D.	30 inches	•	•	

2.4-3 Sleeving

2.4-3.01 All pipe and wire under vehicular paving shall be installed in PVC Schedule 40 sleeves. Sleeves shall be at least twice the diameter of the pipe or wire bundle to be enclosed, with a minimum two-inch size, and shall extend 12 inches beyond each edge of pavement.

2.4-3.02 Sleeving shall be marked at each end at the time of installation with a painted spot on the back face of the curb or other similar marking.

2.4-4 Marking Tape

Metallic backed locating tape shall be installed along the entire length of the sleeve, 12 inches directly above the sleeve. Tape shall be marked "IRRIGATION" in two inch capital letters every three feet along the tape.

2.4-5 Backfill

2.4-5.01 Backfill material shall be clean and free of debris, large rocks and objects with sharp edges.

2.4-5.02 Finish grade of all trenches must conform to adjacent grades without dips, sunken areas, humps or other irregularities.

2.4-6 Landscape Irrigation Submeter

2.4-6.01 A landscape irrigation submeter shall be installed after the domestic water meter in development required to install the submeter in Table 2 (Landscape Water Meter Applicability).

2.4-6.02 An irrigation mainline from the landscape irrigation submeter shall be extended to the rear yard of new single dwelling unit development.

2.5 STREET RIGHTS-OF-WAY AND OPEN SPACE IRRIGATION SYSTEMS

2.5-1 Water Services

2.5-1.01 Center islands, open space areas and street rights-of-way shall have separate meters and services unless they are part of the same maintenance assessment district, whereby, they may share the same meter and service.

2.5-1.02 All water services shall have a City-approved backflow device installed above ground. A guard fence or steel enclosure will be installed if the device is located within five feet of a pedestrian travel way.

2.5-1.03 There shall be no sharing of water with private property.

2.5-1.04 Street water mains shall be shown and identified along with the water meter and service connection. The meter address and I.D.# shall be shown on the irrigation plan.

2.5-2 Electrical Services

2.5-2.01 The location of the following must be shown on the construction drawings:

- Source of electrical power;
- Service entry pedestal with approved detail;
- Conduits and wire conductors with sizes;
- Electrical meter;
- Safety-socket box;
- Circuit breaker enclosure;
- Irrigation controller and enclosure.

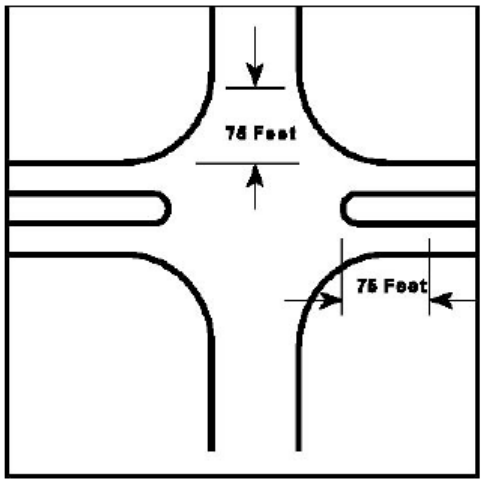
2.5-2.02 In cases where the electric power service is unknown at time of plan check, a note must be added stating that it will be placed on the plans during the "As Built" phase.

2.5-2.03 Center islands, open space areas and rights-of-way shall have their own irrigation controllers unless they are part of the same maintenance assessment district, whereby, they may share the same controller. The controller shall not be located in the center island.

2.5-3 Only materials and equipment that are on the Park and Recreation Department's Approved Irrigation Materials List" (**Appendix "D"**) shall be used. Installation shall be per the San Diego Regional Standard Drawings unless otherwise approved.

2.5-4 Mainline and lateral piping may cross public streets as long as they are placed in sleeves and do not cross within 75 feet of any intersection (**Figure 2-3**).

FIGURE 2-3
MAINLINE & LATERAL PIPING CROSSING PUBLIC STREETS



2.5-5 Heads with low precipitation rates shall be used whenever possible.

2.5-6 Non-spray type irrigation systems shall be used whenever practical for all plantings in the street right-of-way.

2.5-7 Drip systems, when approved for use in the street right-of-way, shall use rigid PVC laterals installed below grade with schedule 80 risers and access caps/sleeves for servicing the emitters, and with self-flushing type emitters.

2.5-8 Pressure reducing valves shall be installed above grade in conjunction with the backflow unit, or below grade in valve boxes.

2.5-9 Check valves shall be installed where lateral piping rises in grade from the control valve.

2.5-10 Remote control valves are to be installed in manifold wherever possible. Each remote control valve will have a straight through globe valve (of the same size) installed with it upstream. Remote control valves installed in manifold will have one globe valve (of the same size as the largest remote control valve) installed upstream of the manifold. All manifold connections are to be red brass (see San Diego Regional Standard Drawing SDI-103).

2.5-11 One-inch size quick coupling valves, each with its own one-inch straight through globe valve installed upstream, will be installed and spaced no further than 200 feet apart. The

need for quick coupler systems in the open space areas shall be determined on a case-by-case basis. The smallest diameter pipe to serve a quick coupler shall be 11/2 inches.

2.5-12 In-line globe valves will be used to allow sectional shutdown of the systems. All globe valves are to be labeled as to size and with an arrow leader pointing to the symbol (Example: 11/2" G.V.).

2.5-13 All irrigation controllers are to be installed in steel enclosures. Controllers will be installed "freestanding" as per San Diego Regional Standard Drawing I-17 (not bolted to the enclosure wall). Enclosure shall be located at a prime observation area with good access and free from irrigation overspray. While the electric power service and controller enclosure may be shared between different assessment districts, each district shall have their own controller(s). Controllers are not to be interconnected.

2.5-14 A minimum of two spare wires are to be installed from the controller to the furthest single valve or cluster of valves in each separate wire run. Pull boxes will be shown and labeled wherever wire splicing is necessary. All control wires shall be color coded as per Supplemental Irrigation Specifications (**Appendix "C"**).

2.5-15 Each and every sprinkler head (except for drip-type systems) shall have an anti-drain/excess flow valve installed below the head as part of the riser assembly unless the sprinkler head is equipped with an internal check valve.

2.5-16 All pressure pipe to be installed underground shall be Schedule 40 P.V.C. for 11/2-inch diameter and smaller, and PVC Class 315 for 2-inch diameter and larger.

2.5-17 All pressure pipe installed above ground in open space areas shall be galvanized steel Schedule 40 pipe or Schedule 40 UV resistant pipe.

2.5-18 All lateral, non-pressure pipe shall be Schedule 40 PVC, 3/4-inch minimum.

2.6 WATER BUDGET

2.6-1 ~~Developments listed in Table 5 shall be subject to~~ All new development with a landscape area of 500 square feet or greater must demonstrate compliance with a Water Budget - Maximum Applied Water Allowance (MAWA) unless exempted in Section 2.6-2.

2.6-2 The following developments are exempt from the requirements of Section 2.6-1

2.6-2.01 Landscape that is part of a registered historic site (local, state or federal);

2.6-2.02 Ecological restoration projects without permanent irrigation;

2.6-2.03 Botanical gardens and arboretums open to the public; and

2.6-2.04 Mined-land reclamation projects without permanent irrigation.

~~**TABLE 5**~~
~~**WATER BUDGET (MAWA)**~~
~~**APPLICABILITY**~~

~~**Type of Development Proposal**~~	~~**Landscape Area[3] Threshold**~~
~~New nonresidential development~~	~~1,000 s.f. and greater~~
~~New multiple dwelling unit development~~	~~1,000 square feet and greater~~
~~New single dwelling unit development~~ ~~Subdivisions~~	~~All subdivider installed landscape*~~

~~* All model homes shall be landscaped consistent with the principles of a water-efficient landscape. Signs shall be used to identify the model as an example of a water efficient landscape, featuring elements such as hydrozones, irrigation equipment, plant materials and other elements that contribute to the water efficiency. Information shall be provided within the model about designing, installing, and maintaining water efficient landscapes; and using irrigation submeters.~~

Comment [a3j3]: Table isn't needed any longer since all development with a landscape area of 500 square feet or greater needs a permit. Any landscape project that needs a City permit (including rehabilitated landscapes) will be subject to the smaller minimum 500 square feet threshold.

2.6-3 The ~~maximum applied water allowance~~ Water Budget- Maximum Applied Water Allowance (MAWA) is calculated using the following formula ~~as follows~~[4] (see calculation worksheets in Appendix E):

~~MAWA = (ETo)(0.62) [(0.7)(LA) + (0.3)(SLA)]~~

MAWA = (ETo)(0.62)[(ETAF x LA) + ((1-ETAF) x SLA)] = gallons per year

For residential landscape areas = (ETo)(0.62)[(0.55)(LA) + (0.45)(SLA)]
For non-residential landscape areas = (ETo)(0.62)[(0.45)(LA) + (0.55)(SLA)]

Legend for Water Budget Calculation Formula

Symbol	**Description of Symbol**
ETo	Evapotranspiration (inches per year)
0.62	Conversion factor to gallons
ETAF	Evapotranspiration Adjustment Factor

~~[3] For purposes of this calculation the landscape area means the entire premises less the area of building footprints, non-irrigated portions of parking lots, driveways, hardscapes (as defined in §113.0103 of the Land Development Code), and areas designated for habitat preservation or brush management Zone 2.~~
~~[4] See Appendix E Water Requirements Worksheets for assistance in calculating water use.~~

0.55 for Residential areas; 0.45 for Non-residential areas	
LA	Landscape Area (square feet)
1- ETAF 0.45 for Residential areas; 0.55 for Non-residential areas	Additional Evapotranspiration Adjustment Factor for Special Landscape Areas and Reclaimed Water
SLA	Special Landscape Area (square feet)

~~Where:~~

~~ETo = Evapotranspiration (inches per year)(see Table 6)~~
~~0.62 = Conversion factor (to gallons)~~
~~0.7 = Evapotranspiration Adjustment Factor~~
~~LA = Landscaped Area (square feet)(see footnote 3)~~
~~0.3 = Evapotranspiration Adjustment Factor for Special Landscape Area and Reclaimed Water~~

~~SLA = Special Landscape Area~~[5]

~~Table 6~~
~~EVAPOTRANSPIRATION (ETo) TABLE~~
~~BY COMMUNITY PLANNING AREA~~

Comment [a3j4]: This Table is already published in LDM Appendix E. No need to duplicate.

~~Community Planning Area~~	~~Average Annual ETo (inches/year)~~	~~Community Planning Area~~	~~Average Annual ETo (inches/year)~~
~~Barrio Logan~~	~~41~~	~~North City FUA Subarea II~~	~~47~~
~~Black Mountain Ranch~~	~~47~~	~~Ocean Beach~~	~~41~~
~~Carmel Mountain Ranch~~	~~51~~	~~Old San Diego~~	~~47~~
~~Carmel Valley~~	~~47~~	~~Otay Mesa~~	~~51~~
~~Centre City~~	~~41~~	~~Otay Mesa-Nestor~~	~~41~~
~~City Heights~~	~~47~~	~~Pacific Beach~~	~~41~~
~~Clairemont Mesa~~	~~47~~	~~Pacific Highlands Ranch~~	~~47~~
~~College Area~~	~~51~~	~~Peninsula~~	~~41~~
~~Del Mar Mesa~~	~~47~~	~~Rancho Bernardo~~	~~57~~
~~East Elliott~~	~~51~~	~~Rancho Encantada~~	~~57~~
~~Eastern Area~~	~~51~~	~~Rancho Penasquitos~~	~~51~~

[5] An Evapotranspiration Adjustment Factor of 1.0 ~~(0.3 additional)~~ is used for Special Landscape Areas. Special Landscape Areas are active and passive recreation areas, areas solely dedicated to the production of fruits and vegetables, and areas irrigated with reclaimed water.

~~Encanto~~	~~51~~	~~Sabre Springs~~	~~51~~
~~Fairbanks Country Club~~	~~47~~	~~San Pasqual~~	~~57~~
~~Greater Golden Hill~~	~~47~~	~~San Ysidro~~	~~47~~
~~Greater North Park~~	~~47~~	~~Serra Mesa~~	~~47~~
~~Kearney Mesa~~	~~47~~	~~Scripps Miramar Ranch~~	~~51~~
~~Kensington-Talmadge~~	~~51~~	~~Skyline-Paradise Hills~~	~~51~~
~~La Jolla~~	~~41~~	~~Southeastern San Diego~~	~~47~~
~~Linda Vista~~	~~47~~	~~Tierrasanta~~	~~51~~
~~Midway-Pacific Highway Corridor~~	~~41~~	~~Tijuana River Valley~~	~~41~~
~~Mira Mesa~~	~~47~~	~~Torrey Highlands~~	~~47~~
~~Miramar Ranch North~~	~~51~~	~~Torrey Hills~~	~~47~~
~~Mission Beach~~	~~41~~	~~Torrey Pines~~	~~41~~
~~Mission Valley~~	~~47~~	~~University~~	~~47~~
~~Navajo~~	~~51~~	~~Uptown~~	~~47~~
~~Normal Heights~~	~~47~~	~~Via De La Valle~~	~~47~~

2.6-4 The ~~estimated total water use~~ Estimated Total Water Use (ETWU) shall not exceed the ~~water budget~~ Water Budget-Maximum Applied Water Allowance (MAWA) as calculated in Section ~~2.6-2~~ 2.6-3.

2.6-5 The ~~estimated total water use~~ ETWU is calculated using the following formula ~~as follows~~ (see calculation worksheets in Appendix E):

ETWU [(ETo)(0.62)][~~(PF x HA/IE)~~ (PF ÷ IE x HA) + SLA] = gallons per year

Legend for Estimated Total Water Use (ETWU) Calculation Formula

Symbol	**Description of Symbol**
ETo	Evapotranspiration (inches per year)
0.62	Conversion factor to gallons
PF	Plant Factor
HA	Hydrozone Area (square feet)
IE	Irrigation Efficiency (0.81 for Drip System devices) (0.75 for Overhead Spray devices)
SLA	Special Landscape Area (square feet)

~~Where:~~

~~ETWU = Estimated total water use per year (gallons)~~
~~ETo = Reference Evapotranspiration (inches)~~

~~PF = Plant Factor from WUCOLS[6]~~
~~HA = Hydrozone Area[7] (high, medium, and low, water use areas) (square feet)~~
~~SLA = Special Landscape Area (square feet)~~
~~0.62 = Conversion Factor~~
~~IE = Irrigation Efficiency (minimum 0.71)~~

2.7 LANDSCAPE IRRIGATION AUDIT

Development subject to Section 2.6 - Water Budget, shall be subject to the following audit requirements.

2.7-1 A landscape irrigation audit is intended to verify that all irrigation systems, plant materials, and landscape features have been installed and operate as approved.

2.7-2 All landscape irrigation audits shall be conducted by a ~~California registered landscape architect, a licensed landscape contractor, or other~~ professional ~~licensed~~ authorized by the State to perform this work.

2.7-3 The professional that conducts the landscape irrigation audit shall certify that all irrigation systems, plant materials, and landscape features have been installed and operate as approved, and shall submit that certification to the City prior to occupancy and use.

~~[6] The California Department of Water Resources 1999 publication by U.C Cooperative Extension employee Larry Costello. beginning on page 45 of the following link (www.owue.water.ca.gov/docs/**wucols**00.pdf).~~
~~[7] The surface area of water features (swimming pools, spas, ponds, lakes, fountains and similar features) are included in the high water use hydrozone and the surface area of artificial turf, is included in the low water use hydrozone.~~

SECTION III: BRUSH MANAGEMENT

3-1 BRUSH MANAGEMENT – DESCRIPTION

Fire safety in the landscape is achieved by reducing the readily flammable fuel adjacent to structures. This can be accomplished by pruning and thinning of native and naturalized vegetation, revegetation with low fuel volume plantings or a combination of the two. Implementing brush management in an environmentally appropriate manner requires a reduction in the amount and continuity of highly flammable fuel while maintaining plant coverage for soil protection. Such a transition will minimize the visual, biological and erosion impacts while reducing the risks of wildland fires.

3-2 BRUSH MANAGEMENT- REQUIREMENTS

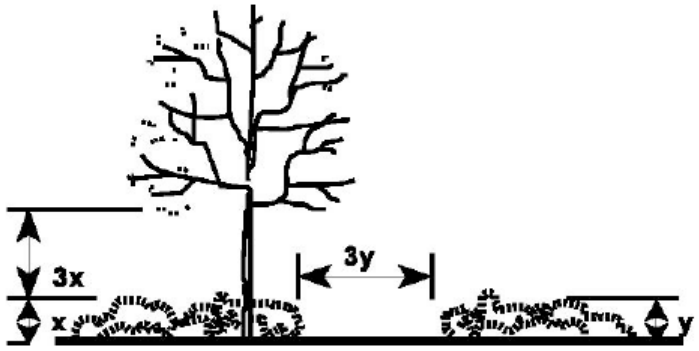
3.2-1 Basic requirements – All Zones

3.2-1.01 For zone two, plants shall not be cut below six inches.

3.2-1.02 Debris and trimmings produced by thinning and pruning shall be removed from the site or if left, shall be converted into mulch by a chipping machine and evenly dispersed, non-irrigated, to a maximum depth of 6 inches.

3.2-1.03 Trees and large tree form shrubs (e.g., Oaks, Sumac, Toyon) which are being retained shall be pruned to provide clearance of three times the height of the under story plant material or six feet whichever is higher (**Figure 3-1**). Dead and excessively twiggy growth shall also be removed.

FIGURE 3-1
PRUNING TREES TO PROVIDE CLEARANCE FOR BRUSH MANAGEMENT



3.2-1.04 All plants or plant groupings except cacti, succulents, trees and tree-form shrubs shall be separated by a distance three times the height of the tallest adjacent plants (**Figure 3-1**).

3.2-1.05 Maximum coverage and area limitations as stated herein shall not apply to indigenous native tree species (i.e., Pinus, Quercus, Platanus, Salix and Populus).

3.2-2 Zone 1 Requirements - All Structures

3.2-2.01 Do not use, and remove if necessary, highly flammable plant materials (see **Appendix "B"**).

3.2-2.02 Trees should not be located any closer to a structure than a distance equal to the tree's mature spread.

3.2-2.03 Maintain all plantings in a succulent condition.

3.2-2.04 Non-irrigated plant groupings over six inches in height may be retained provided they do not exceed 100 square feet in area and their combined coverage does not exceed 10 percent of the total Zone 1 area.

3.2-3 Zone 2 Requirements – All Structures

3.2-3.01 Individual non-irrigated plant groupings over 24 inches in height may be retained provided they do not exceed 400 square feet in area and their combined coverage does not exceed 30 percent of the total Zone 2 area.

SECTION IV: REVEGETATION AND EROSION CONTROL GUIDELINES

4.1 PERMANENT REVEGETATION

4.1-1 Revegetation Adjacent to Native Vegetation

Revegetation of manufactured slopes and other disturbed areas adjacent to areas of native vegetation shall be accomplished in a manner so as to provide visual and horticultural compatibility with the indigenous native plant materials. The following guidelines are in addition to the guidelines and criteria for slope revegetation and brush management. Further restrictions may apply in natural preserve areas such as Tecolote Canyon and Penasquitos Canyon or as required as part of environmental mitigation efforts. Transitional landscape treatments between non-native landscapes and undeveloped areas may be required or considered by the City Manager. When so required, the following guidelines shall apply:

4.1-1.01 The plant palettes for transitional landscapes shall typically consist of a combination of appropriate and compatible native and nonnative species.

4.1-1.02 The mix of native and non-native plant materials should generally vary. Areas contiguous to existing native vegetation shall be planted with native materials exclusively.

4.1-1.03 Invasive (i.e., those readily capable of reproducing and spreading into native, non-irrigated areas) non-native plant species including but not limited to those listed on **Table 1** are prohibited in all transitional landscapes.

4.1-1.04 Noxious weeds and invasive plants (e.g., Pampas Grass) that sprout in transition areas shall be promptly removed.

4.1-1.05 Permanent irrigation is prohibited in the portions of transition areas contiguous to the existing native vegetation.

4.1-1.06 Required mulching and hydroseeding as specified in the landscape regulations, shall follow the guidelines in **Sections 4.3** and **4.4** of the Landscape Standards.

4.1-1.07 Required slope revegetation shall follow the guidelines in **Section 4.2** of the Landscape Standards.

4.1-2 General Revegetation

4.1-2.01 Revegetation on manufactured slopes and other disturbed areas that are not adjacent to native vegetation shall be accomplished to provide a stable soil cover that prevents erosion.

4.1-2.02 Required mulching and hydroseeding as specified in the landscape regulations, shall follow the guidelines in **Sections 4.3** and **4.4** of the Landscape Standards.

4.1-2.03 Required slope revegetation shall follow the guidelines in **Section 4.2** of the Landscape Standards.

4.2 SLOPE REVEGETATION GUIDELINES

These guidelines establish the acceptable standards for the design and installation of slope revegetation.

4.2-1 Requirements for revegetation may be waived by the City Manager where cut slopes are not subject to erosion due to their rocky character or where the slopes are protected against erosion and instability to the satisfaction of the City Engineer.

4.2-2 A minimum of 50 percent of the total slope area shall be planted with deep rooting groundcovers, (i.e. those with a typical root depth of 5 feet or greater). For seeded plantings, at least 50 percent of the viable seed count shall be deep rooting species.

4.2-3 All the plant materials shall be appropriate to the site conditions, water conserving and appropriately spaced to control soil erosion.

4.3 MULCHING PROCEDURES

The following procedures will be followed when mulching is required by the landscape regulations or when proposed by the applicant.

4.3-1 Jute netting and other approved geotextile materials shall be installed and secured per manufacturer's specifications and in a manner precluding sheet flows and rilling below the material surface.

4.3-2 Straw Stabilization:

- Straw mulch shall be uniformly spread at the rate of two tons per acre.
- Straw on all cut slopes shall be "tacked" with binder at a minimum rate of 160 pounds per acre. The binder shall be an organic derivative or processed organic adhesive.
- Straw on all fill slopes shall be incorporated into the soil with a bladed roller so that the straw will not support combustion or blow away and will leave a uniform surface.

4.3-3 Wood Products:

- Shredded wood products shall be uniformly spread to a minimum depth of two inches.
- When used in conjunction with indigenous native container stock, the mulch shall be applied at the conclusion of the initial 90-day maintenance period.

4.4 HYDROSEEDING PROCEDURES

4.4-1 Seed mixes shall be specified by the pure live seed of each species.

4.4-2 Fiber mulch shall be applied at a minimum rate of 2,000 pounds per acre except when used in conjunction with straw mulch, when it shall be applied at a minimum rate of 400 pounds per acre.

4.4-3 A wetting agent consisting of 95 percent alkyl polyethylene glycol ether shall be applied as per manufacturers' recommendations.

4.4-4 Equipment used for the application of slurry shall have a built-in agitation system to suspend and homogeneously mix the slurry. The slurry mix shall be dyed green. The equipment must have a pump capable of applying slurry uniformly.

4.5 MAINTENANCE REQUIREMENTS

4.5-1 Permanently irrigated slopes shall be maintained for a period no less than 90 days.

4.5-2 Nonpermanently irrigated areas shall be maintained for a period not less than 25 months.

4.5-3 All revegetated areas shall be maintained by the Permittee until final approval by the City Manager. The maintenance period begins on the first day following acceptance and may be extended at the determination of the City Manager.

4.5-4 Prior to final approval, the City Manager may require corrective action including but not limited to, replanting, the provision or modification of irrigation systems, and the repair of any soil erosion or slope slippage.

SECTION V: STREET RIGHTS-OF-WAY AND OPEN SPACES

5.1 INTRODUCTION

All landscape improvements in street rights-of-way and those in open space areas that are to be maintained by the City, either directly or by administered contract, shall comply with all relevant sections of the landscape standards except as superseded or modified by the requirements of this section. Additional restrictions on the location of landscape improvements may be required per the Street Design Manual under "Additions/Design Criteria - Sight Distance." These additional restrictions do not apply to trees maintained per the criteria of this section.

5.2 CENTER ISLAND LANDSCAPING

5.2-1 All center island paving shall be integral colored, stamped concrete (**Appendix "C"**) unless otherwise approved by the City Manger. Colors shall be limited to those in **Appendix "C."**

5.2-2 Planted areas shall have a minimum width of two feet and shall have a minimum inside diameter (i.d.) of four feet and a height no greater than six inches above the median curb. A two-foot maintenance walk shall be provided around the perimeter of medians, inclusive of curbing (refer to standard drawing SDG-112).

5.2-3 Areas greater than 100 square feet in size shall be level or graded to drain to their centers with any runoff resulting from precipitation collected through a system of drain inlets and appropriately sized pipes to carry it to a storm drain system.

5.2-4 Turf and high water use plants shall not be used in medians.

5.3 DEDICATED OPEN SPACE AREAS

5.3-1 All disturbed open space areas shall be revegetated according to the guidelines in Sections 3 and 4, the Brush Management Guidelines and the Slope Revegetation Standards. These areas shall be maintained by the permittee for a minimum of 25 months before the open space can be accepted for maintenance by the Park and Recreation Department.

5.3-2 To reestablish vegetation in disturbed areas, a temporary irrigation system shall be installed. This system may be removed at the City's discretion, prior to acceptance of maintenance for the areas in question at the end of the maintenance period.

San Diego Municipal Code

Land Development Code

Landscape Standards

Appendix A

Reference Materials For Water-Conserving Plants & Irrigation Systems

REFERENCES

WATER-CONSERVING PLANTS – BOOKS

- Clark, D.E *Western Garden Book*, Menlo Park CA: Lande Publishing Co. 1979
- Schmidt, M.G. *Growing California Native Plants*, Los Angeles CA: University of California Press, 1980
- Robie, Ronald. *Plants for California Landscapes*, Sacramento CA: Department of Water Resources, 1979
- Duffield, and Jones. *Plants for Dry Climates*, Tucson AZ: H.P. Books, 1981
- Perry, Bob. *Trees and shrubs for Dry California Landscapes*, San Dimas: Land Design Publishing, 1981
- *Selected California Native Plants With Commercial Sources*, Saratoga CA: Saratoga Horticultural Foundation, Third Edition

IRRIGATION SYSTEMS – BOOKS

- Pair, H. and Hinz, W. and Reid, C. and Fronst, K., ed. *Irrigation*. Maryland: Irrigation Association, Fifth Edition, 1983
- Sarsfield, Chet, *Book of Tables*. California: Irrigation Technical Services, P.O. box 268, Lafayette, CA 94549
- Simon, A. *Basic Hydraulics*. New York: John Wiley & Sons, 1981
- Watkins, James A. *Turf Irrigation Manual*, Telsco Industires, 1987

OTHER REFERENCE MATERIALS

-
- AB 325 Model Water Efficient Landscape Ordinance http://www.owue.water.ca.gov/docs/WaterOrdSec490.cfm
- AB 1881 Water Conservation in Landscaping http://www.owue.water.ca.gov/landscape/ord/updatedOrd.cfm#dwr
- California Landscape Contractor Association (CLCA) http://www.clca.org
- California Integrated Waste Management Board – Commercial Landscapes, www.ca.gov/organics/landscaping
- http://www.cdflmu.org/4291.pdf
- California Stormwater Quality Association (CASQA) Stormwater Best Management Practice Handbook – http://www.cabmphandbooks.com
- Education Resources www.clca.org, www.irrigation.org, www.thegarden.org, www.miracosta.cc.ca.us, www.cuyamaca.edu, www.swc.cc.ca.us, www.bewaterwise.org
- Environmentally Friendly Landscapes http://www.beyondpesticides.org/pesticidefreelawns/, www.beyondpesiticides.org
- Evapotranspiration Data www.cimis.water.ca.gov
- Fire Safe Council – http://www.firesafecouncil.org/education/index.cfm
- Firewise Communities – http://firewise.org
- "General Guidelines for Creating Defensible Space"

- State Board of Forestry and Fire Protection and California Department of Forestry and Fire Protection, February 2006 – http://www.bof.fire.ca.gov/pdfs/copyof 4291finalguidelines9_29_06.pdf
- Gray Water www.owue.water.ca.gov/docs/graywater_guide_book.pdf
- Gray Water Permits http:www.sdcounty.ca.gov/deh/inspections_permits.html#land
- Home Landscaping for Fire – University of California, Division of Agriculture and Natural Resources – http://www.anrccatalog.ucdavis.edu/pdf/8228.pdf
- Integrated Pest Management (IPM) – University of California, Cooperative Extension
- hhtp://www.anrcatalog.ucdavis.edu/pdf/8228/pdf
- Invasive Plants www.cal-ipc.org
- Irrigation Audits
- Irrigation Association (IA) http://www.irrigation.org/certification
- Irrigation and Maintenance BMPs www.irrigation.org/gov/default.aspx?pg=BMPs.htm&id+104
- Low Impact Development Handbook, County of San Diego
- Mosquito Control www.co.san-diego.ca.us/deh/chd/wnv/index.html
- Natural Resources Conservation Service Soil Surveys for California
- http://www.websoilsurvey.nrcs.ucda.gov/app/WebSoilSurvey.aspx
- Professional Landscape Network (PLANET)– http://www.landcarenetwork.org
- Rain Water Harvesting www.twdb.state.tx.us
- Regional Water Quality Control Board www.swrcb.ca.gov/rwqcbp
- San Diego County Evapotranspiration Map www.sdcwa.org
- Smart Water Application Technologies (SWAT)
- http://www.irrigation.org/SWAT/Industry/ia-tested.asap
- Soil www.healthysoil.org
- State Water Resources Control Board Stormwater Program
- http:www.waterboards.ca.gov/stormwtr.index.html
- Storm Water www.projectcleanwater.org/pdf/watershed-ordinance.pdf, www.casqa.org
- Water Conservation www.sdcwa.org
- Water sense, EPA - http://www.epa.gov/watersense
- Water Use of Common Ornamental Landscape Species, WUCOLS, www.wucols.water.ca.gov

NATIONAL XERISCAPE COUNCIL, Inc, 940 E. 51 Street, Austin, TX 78751-2241. (512) 454-8626

- Proceedings, Xeriscape 85. 1985, 1986, 1987, 1988, & 1989 Editions
- Fry, A. and Gray, A. *Sprinkler Irrigation Handbook*. Rainbird Sprinkler Mfg. Corp. California, 1969
- Manufacturer's Literature. Rainbird Sprinkler Mfg. Corp., 1987
- Manufacturer's Literature. Toro company, 1987
- *Saving Water in Landscape Irrigation*. University of California, division of Agricultural Sciences. Leaflet No. 2976. 1977

San Diego Municipal Code

Land Development Code

Landscape Standards

Appendix B

Brush Management Implementation Guidelines

(TO BE ADDED AT A FUTURE DATE.)

San Diego Municipal Code

Land Development Code

Landscape Standards

Appendix C

Improvements For Street Rights-of-Way and Open Space To Be Maintained By the City

APPROVED COLORS FOR CONCRETE CENTER ISLAND PAVING (Refer to **Section 5.2**)

L.M. Scoffield Company or approved equal Chromix Admixtures™

C-11 Desert Sand
C-12 Mesa Beige
C-13 Tawny Pink
C-15 Coachella Sand
C-20 Limestone
C-21 Adobe Tan
C-22 Coral Red
C-25 Sombrero Bluff
C-26 Antique Cork
C-28 Riverside Buff

SUPPLEMENTAL IRRIGATION SPECIFICATIONS

(The Supplemental Irrigation Specifications shall be incorporated in the design and provided within the written irrigation specifications for all Street Rights-of-Way and Open Space projects that will be maintained by the City.)

SUPPLEMENTAL IRRIGATION SPECIFICATIONS

1. **GENERAL:** All materials and equipment used in sprinkler irrigation work shall be new and without flaws of defects and of quality and performance as specified. Prior to installation of any irrigation work, the contractor shall submit for approval by the city, a list of all proposed materials and equipment. Should the contractor propose to use material(s) or equipment other than those as listed as “approved”, the contractor shall submit in writing, to the city, a request to deviate from the approved list. Samples of the material(s) or equipment should accompany the request to assist in the evaluation of the proposed substitution. The burden of proof shall be borne by the contractor.

2. **MAIN LINE PIPE CONNECTIONS:** Shall be made horizontally per standard drawings i-28 and I-29.

3. **PIPE THRUST BLOCKS:** All pressure pipe 4" and smaller, polyvinyl chloride or asbestos cement shall have the correct sized concrete thrust block installed at every abrupt change of alignment; at globe or gate valves, at tees, elbows and crosses, and at ends of pipe runs; or wherever the field engineer deems one to be necessary. Thrust blocks are to be installed as per standard drawings w-17, w-18 and w-19 and sdw-100, sized as for 4" pipe.

4. **PIPE SLEEVES:** Shall be sch. 40 pvc, two times the pipe size diameter and extend 12" beyond each side of pavement. The letters “e” for electrical or “w” for water shall be stamped or chiseled on the pavement directly above the sleeve.

5. **TRENCH MARKER TAPE FOR ALL PRESSURE PIPE:** Shall have a continuous blue colored trench marker metallic tape placed nine inches (9") below finished grade and directly above the buried pipe.

6. **SAND ENCASEMENT FOR PIPES:** For all irrigation pipe, direct burial control wire and electrical conduit shall be plaster or mortar sand as per section 200 of the standard specifications, with a minimum sand equivalent of 50.

7. **REMOTE CONTROL VALVE BOXES:** Shall be concrete with a cast iron locking lid. The contractor shall paint the identification number of the valve box. The paint shall be white or yellow aluminum asphaltic-base waterproof paint. In addition, weatherproof, plastic identification tags shall be affixed to the colored conductor in the valve box.

8. **VALVE BOX LOCKING LIDS:** The contractor shall rework the locking toggles of the concrete valve boxes by replacing the existing clevis pin and sheet metal clip with a marine-type stainless steel machine bolt and self-locking unit. Apply oil to lubricate and to prevent rust.

9. **ANTI-DRAIN/EXCESS-FLOW VALVE:** Shall be installed under each sprinkler head which is not equipped with an internal check valve (as anti-geyser device as well as a low head anti-drain valve).

10. **ALTERNATE PIPE SLEEVE LOCKING CAP FOR VALVES:** Shall be per standard drawing i13, heavy duty red brass locking cap threaded to fit 2" diameter sch. 40 pvc pipe.

11. **MULTIPLE CONTROLLER INSTALLATIONS:** Enclosures shall be sized accordingly. No 110 volt wire runs shall pass from controller cabinet to cabinet. Each controller shall have a separate electrical service through a raceway. Provide one power off-on switch for each controller.

12. **DIRECT BURIAL CONTROL WIRES:** Shall be solid copper, 600 volt, type uf, conforming to the standard specifications and drawings, special provisions and the following wire colors and installation requirements.

NEUTRAL WIRES: White (#12 awg), do not interconnect neutral wires between controllers.

PILOT WIRES: (#14 awg), use as many as necessary.

VALVE NO.	VALVE NO.
1/19*. Yellow	10. White w/ red stripe
2/20*. Orange	11. Yellow w/ red stripe
3/21*. Blue	12. Blue w/ stripe
4/22*. Black	13. Orange w/ red stripe
5/23*. Brown	14. Purple w/ white stripe
6/24*. Purple	15. Brown w/ white stripe
7. Yellow w/ black stripe	16. Yellow w/ white stripe

8. Orange w/ black stripe 17. Blue w/ white stripe
9. Red w/ black stripe 18. Red w/ white stripe

SPARE WIRES: Two (2) red (#14 awg) from furthest valve or manifold to each controller.

*colors repeat for valves beyond 18.

13. **WIRE CONNECTIONS:** Neutral, pilot and spare wires shall be installed with a 2' - 0" coiled excess wire length at each end enclosure. Each and every wire splice shall be soldered together (using 60-40 solder), then encased in the waterproof epoxy connectors. Wire splices shall be made only in valve or pull boxes.
14. **WIRE BUNDLES:** Each individual controller clock's control wires shall be bundles and taped together with colored tape at intervals not exceeding 10'-0". Controller identification tape colors shall be as follow: (use as many as necessary).

CONTROLLER COLOR
"A" BLACK
"B" RED
"C" WHITE
"D" BLUE
"E" GREEN
"F" YELLOW

15. **WIRES IN PULL BOXES:** Shall be loose and shall not come within three (3") inches from lid. Boxes shall be sized accordingly to accommodate this requirement.
16. **TRENCH MARKER TAPE FOR WIRES:** All direct burial wires shall be marked with a continuous red colored trench marker plastic tape placed nine inches (9") below finished grade and directly above the buried wires. Tape shall be three inches (3") wide.
17. **WIRE TESTING:** Shall be tested for continuity, open circuits, and unintentional grounds prior to connecting to equipment. The minimum insulation resistance to ground shall be fifty (50) megohms. Any wiring not meeting this requirement shall be replaced, at the contractor's expense.
18. **GUARANTEE:** The contractor's guarantee shall consist of section 308-7 of the standard specifications and the following:

    The entire irrigation system shall be guaranteed against defects in materials and workmanship for a period of one (1) year from the date of acceptance of work. Should the contractor fail during the guarantee period to expeditiously correct a defect upon written notification by the city, the city shall cause the work to be corrected and bill the actual costs incurred to the contractor. Defect corrections shall include the complete restoration of existing improvements that were damaged as a result of the defect.

19. **AS BUILT IRRIGATION PLANS:** A reduced copy of the approved as-built irrigation plan(s), color coded by stations and laminated in plastic, shall be mounted on the inside of each controller enclosure for maintenance personnel at the time of the final acceptance.
    I

TABLE
IRRIGATION LEGEND FOR PUBLIC PROJECTS

IRRIGATION LEGEND FOR PARK & RECREATION CONSULTANTS					
IRRIGATION LEGEND					
SYMBOL	DESCRIPTION	RADIUS	GPM	MANUFACTURER/ MODEL NO.	
• •	*Consultant to describe type of heads and assign identification numbers - special symbols may be used for drip and other special heads with prior approval by Park and Recreation Department*				I-1 thru I-3
• •					
• •					
↓					
M	Water Meter				
Ⓟ	Pressure Regulating Valve				Similar to I-14
◄	Remote Control Valve				I-14
⊗	Gate Valve w/ alternate pipe sleeve installation				I-13
⊗	Globe Valve w/ alternate pipe sleeve installation				I-12
◉	Quick Coupling Valve (1" - size minimum)				I-5
⋈	Automatic Controller				I-17 or I-18
------	Direct Burial Control Wire (Solid Copper - Color Coded)				I-16
P.B.	Pull Box (Low Voltage - Locking Lid / High Voltage - Bolt Down Lid)				I-15
	2" and larger Mainline - Class 315 PVC w/Sch 80 fittings or bell gasket fittings for 3" and larger				I-25 or I-26
	1 ½ " and smaller Mainline - Sch. 40 PVC				I-25
	Lateral Lines - Sch. 40 PVC, ¾ " Minimum Size				I-25
G.I.	Galvanized Pipe Sch. 40				I-20 thru I-24
CU	Copper Pipe Type "L"				I-25
⊗⊗⊗	Reduced Pressure Backflow Preventer				W-27
— — —	Potable Water				
■	Hose Bibb (Garden Valve				I-6

San Diego Municipal Code

Land Development Code

Landscape Standards

Appendix D

Approved Irrigation Materials List

1. REDUCED PRESSURE BACKFLOW PREVENTERS AND ENCLOSURES:

1.1 Reduce Pressure Backflow Preventers

(Assemblies shall include all necessary Test Cocks with Full Port Valves included.) Febco #825Y BV; #825YAR Febco #880 'N' Shape Febco #880V Vertical Wilkins #575 RP Hershey Beeco FRP-11/6 CM Series Watts 009 Series; 909 Series**1.2 Backflow Enclosures**

(Sharp edges are not allowed on enclosures)
Rain Man #117371A (Zinc Plated, with 2 Coats Black Polyurethane Baked –On Paint)
Strong Box #SBBC - Al or Ali (Aluminum)
Le Meur (Stainless Steel Mesh)
All-Spec (Stainless Steel Mesh)

2. IRRIGATION CONTROLLERS AND ENCLOSURES:

2.1 Irrigation Controllers

Irritrol MC-Plus
Rainbird ISC
Rainmaster RME Series
Cal Sense 2100/et-1

2.2 Controller Enclosures

(Stainless Steel only)
All Spec
La Max
Strong Box
Rain Man

3. MASTER CONTROL VALVES:

(24 volt, Electric, Bronze, Normally Open)
Griswold 2160
Superior 3100

4. FLOW SENSORS DEVICES:

Data Industrial Flow Sensor 220P
Data Industrial Meter 600
Cal Sense FM Series

5. PRESSURE REDUCING VALVES:

(Pilot Operated, Stainless Steel Trim)
CLA-VAL #90-01BS (1 1/4" - 3" Size)
CLA-VAL #90-01BS (4" and Larger)
(With Stainless Steel Trim for Manual and Pilot Valves)
Bailey #400
Wilkins #500
Watts 25 AUB Series

6. ISOLATION VALVES:

6.1 Globe Valves - 3" and Smaller Bronze
Wilkins #215
Champion #100
Buckner #22000

6.2 Gate Valves - 4" and Larger Cast Iron
Clow
Mueller
I.O.W.A.

6.3 Locking Cap for Globe/Gate Valve Sleeves
Rainbird #63100 with #2049 Key
Buckner #72

7. REMOTE CONTROL VALVES:
(24-volt Electric, Bronze, Normally Closed)
Rainbird EFB-CP Series
Superior 950-DW; 4000 (Reclaimed)
Griswold DWS and DW-PRS Series
Toro 216 Series

8. QUICK COUPLING VALVES:

8.1 Quick Coupling Valves - Two Piece with Locking Cover
Rainbird #44 LRC
Buckner #25016

8.2 Quick Coupling Valve Keys - Single Lug
Rainbird #44K
Buckner #25011

8.3 Reclaimed Water Quick Coupling Valves - One Piece, Red Brass Acme - Thread with Locking Lavender Cover
Toro #474-44
Nelson #7645

8.4 Reclaimed Water Quick Coupling Valve Key - Acme-thread
Toro #464-03
Nelson #7641

9. IRRIGATION BOXES:

9.1 Remote Control Valve Boxes and Pull Boxes with Cast Iron Locking Lid
Concrete: Brooks #3-HL
Concrete: Christy #B3-3 with B3TL
Concrete: San Diego Precast
Concrete: J & R 3HL

9.2 Quick Coupling Valve Boxes with Concrete Lid
Concrete: Brooks #1-RD
Concrete: Christy #F-8 with F8D
Concrete: San Diego Precast #1A

10. IRRIGATION HEADS:

10.1 Pop-Up Rotor Heads, Oversize - Full Circle With 50' - 60' Radius
Rainbird #41-51A SAM-RC, R-70FC, Talon TA-80-FC w/S.S. Riser Buckner #11360-06 Hunter #I-40, I-25 (With Factory Installed Nozzles) Toro 640, S2001

10.2 Pop-Up Rotor, Heads Oversize - Part Circle With 50' - 60' Radius
Rainbird #47A SAM-RC, R-70FC, Talon TA-85-PC w/S.S. Riser
Hunter #I-40 Ads, I-25 ADV/ADS (With Factory-installed Nozzles) Toro 640, S2001

10.3 Shrub & Pop-Up Rotor Heads, Standard - Full Circle With 40' - 50' Radius
Rainbird #31A RC, Falcon, T-Bird
Buckner #10060-06
Hunter #I-20, I-25 (With Factory-installed Nozzles)
Toro 640, S700C

10.4 Shrub & Pop-Up Rotor Heads, Standard - Part Circle With 40' - 50' Radius
Rainbird #37A RC, Falcon w/stainless steel riser, T-Bird Buckner #10061-06 or #17061-06 Hunter #I-20 ADS, I-25 ADV/ADS (With Factory-installed Nozzles)
Toro 640, S700C

10.5 Shrub & Pop-Up Rotor Heads Undersize - Full Circle With 30' - 40' Radius
Rainbird #21A RC
Buckner #11330-06
Hunter #I-20 (With Factory-installed Nozzles)
Toro S700C

10.6 Shrub & Pop-Up Rotor Heads Undersize - Part Circle With 30' - 40 Radius
Rainbird #27A RC
Buckner #11300-06 Series
Hunter #I-20 ADS (With Factory-installed Nozzles)
Toro S700C

10.7 Shrub & Pop-Up Rotor Heads Short Range - Full or Part Circle With 16' - 30' Radius
Rainbird T-Bird
Hunter G Series, Stainless Steel
Toro S700C

10.8 Brass Impact Rotor Heads (Riser Mount) Oversize - Full or Part Circle With 60' - 70' Radius
Rainbird #35 PJADT-TNT (With 1/4" Nozzle)
Buckner AI-103 or AI-123

Standard - Full or Part Circle With 45' - 50' Radius
Rainbird #35 PJADJ-TNT (With 3/16" Nozzle)
Buckner AI-73 BU

Undersize - Full or Part Circle With 30' - 40' Radius
Rainbird #25 BPJDA-TNT (With 5/32" Nozzle)
Buckner AI-53SB-AB

10.9 Shrub Spray Heads -Fixed - Full or Part Circle
Rainbird #B Series with PA-8S Adapter,
Rainbird 1800 Series with PA-8S PRS (Pressure Regulating Riser)
Hunter #I-10 and “R” Type (90,180, and 360 Degrees Only; with factory-installed

nozzles)
Thompson #460 Series
Toro #570S with Adapter

10.10 Shrub Spray Heads - Plastic Pop Ups Full or Part Circle
Rainbird #1800 Series, 1800 Sam, 1800 Sam PRS,
Rainbird 1800 with Microsprays
Toro #570
Hunter "S" or "R" Type (90, 180, and 360 Degrees Only)

10.11 Shrub Bubblers Pressure CompensatingFlood Type
Rainbird #1400 Series
Buckner #13000 and #13001
Thompson #700A

10.12 Shrub Bubblers Pressure CompensatingStream Type
Rainbird #1500 Series
Buckner #13010

11. ANTI-DRAIN/EXCESS FLOW VALVES:
Valcon #ADV-XS, #ADV
King Brother's KBI

12. PIPE AND FITTINGS:

12.1 Cast Iron Fittings/ Ductile Iron Fittings for Mainline (AWWA-C110) Short Body/Cement Lined
Dayton Foundry Tyler Pipe and Foundry Leemco-Slant Bell Fittings

12.2 Cast Iron Joint Restraints:
Leemco

12.3 Polyvinyl Chloride Pipe (PVC):
EPCO
Pacific Plastic
PW Pipe
J-M Mfg.
Finn
Apache
Brownline
Alertline (Reclaimed Water)
Waterwarn (Reclaimed Water)

12.4 Polyvinyl Chloride Pipe (PVC) Fittings:
Dura
Lasco
Sloan
Plastiline
Spears

12.5 Swing Joints/Height Adjusters
Dura
Toro 850 Series
Olson TSR-1

13. TRENCH MARKER TAPE:
Allen Marking Tape Paul Potter Warning Tape, Inc. 'Alarmatape'

14. WIRE CONNECTORS:
Pen-Tite
Dry Splice

San Diego Municipal Code

Land Development Code

Landscape Standards

Appendix E

Water ~~Requirements~~ Budget Landscape Worksheets

~~LANDSCAPE~~ WATER BUDGET ~~REQUIREMENTS~~
LANDSCAPE WORKSHEET

This project worksheet is to be submitted to the City when the proposed development is subject to the water budget requirement in Chapter 14, Article 2, Division 4 (Landscape Regulations).

Project Name: _____ **Project #:** _____

Project Address: _____

Individual/Business Completing the Worksheet _____

Phone Number _____

---

1. DEFINITIONS:

~~**ET Adjustment Factor**: A factor that when applied to reference evapotranspiration adjusts for plant water requirements and irrigation efficiencies, two major influences on the amount of water that is required for a healthy landscape.~~

Estimated Total Water Use (ETWU): The total water used for the landscape based on the plants used and irrigation method selected for the landscape design. The ETWU shall not exceed the MAWA.

Evapotranspiration: The quantity of water as measured in average inches per year that evaporated from adjacent soil surfaces and transpired by plants during a specific time period. (Evapotranspiration data may be found at www.cimis.water.ca.gov. You may obtain a free ~~pass word~~ password from the Department of Water Resources. The site also holds an abundance of informational links and complete instructions.)

Evapotranspiration Adjustment Factor (ETAF): A factor that when applied to reference evapotranspiration adjusts for plant water requirements and irrigation efficiencies, two major influences on the amount of water that is required for a healthy landscape.

Hydrozone: A section or zone of the landscaped area having plants with similar water needs that are served by a valve or set of valves with the same schedule. A hydrozone may be irrigated or non-irrigated. For the purpose of the calculation, the surface area of manmade water

features (see LDM Section 1.8) are included in the high water use hydrozone, and the surface area of artificial turf and temporary irrigation is included in the low water use hydrozone.

Irrigation Audit: An in-depth evaluation of the performance of an irrigation system conducted by a professional authorized by the State to perform such work. An irrigation audit includes, but is not limited to: inspection, system tune-up, system test with distribution uniformity or emission uniformity, reporting overspray or runoff that causes overland flow, and preparation of an irrigation schedule.

Landscape Area: The entire premises less the area of building footprints, non-irrigated portions of parking lots, driveways, hardscapes (as defined in ~~§113.0103 of the~~ Land ~~development~~ Development Code Section 113.0103), and areas designated for habitat preservation or ~~brush management~~ Brush Management Zone 2.

Plant Factor: A factor that when multiplied by ~~reference~~ the average inches per year evapotranspiration rate, estimates the amount of water used by plants. Plant water use calculations are based on the current Water Use Classification of Landscape Species (WUCOLS) list ~~in WUCOLS III IV~~ (~~www.owue.water.ca.gov/docs/**wucols**00.pdf~~) published by the University of California Cooperative Extension and the California Department of Water Resources: (http://ucanr.edu/sites/WUCOLS/Download_WUCOLS_IV_List/).

Plant Water Use	Plant Factor	Also includes
Very Low	0.0 to 0.1	
Low	0.1-0.3	Artificial Turf; Temporary Irrigation
Moderate	0.4-0.6	
High	0.7-1.0	Water features
Special Landscape Area	1.0	

~~The average plant factor are as follows:~~

- ~~*Low water using plants* is less than 0.2;~~
- ~~*Medium water using plants* is 0.5; and~~
- ~~*High water using plants* is 0.8.~~

~~Factors for non plant material are as follows:~~

- ~~Water Features. The surface area of man-made water features (pools, ponds, spas and similar features) are calculated using the co-efficient for high water using plants.~~
- ~~Artificial Turf. The surface area of artificial turf is calculated using the co-efficient for low water using plants with a distribution uniformity (DU) of 1.0.~~

Special Landscape Area: Areas used for active and passive recreation areas, areas solely dedicated to the production of fruits and vegetables, and areas irrigated with reclaimed water.

Water Budget - Maximum Applied Water Allowance (MAWA): The upper limit of annual applied water for the established landscaped area expressed in gallons per year. It is based upon the area's reference evapotranspiration (ETo), the evapotranspiration adjustment factor (ETAF), and the size of the landscape area.

---

2. DETERMINE THE WATER BUDGET

Water Budget-MAWA Calculation

The ~~water budget~~ Water Budget-MAWA is ~~to be~~ calculated using the following formula:

~~Water Budget = (ETO)(0.62) [(0.7)(LA) + (0.3)(SLA)]~~

Water Budget-MAWA = (ETo)(0.62)[(ETAF x LA) + ((1-ETAF) x SLA)] = gallons per year

For residential landscape areas = (ETo)(0.62)[(0.55)(LA) + (0.45)(SLA)]
For non-residential landscape areas = (ETo)(0.62)[(0.45)(LA) + (0.55)(SLA)]

~~Where:~~

~~ETo = Evapotranspiration (inches per year)(see Table 6 or ETo Map)~~
~~0.62 = Conversion factor (to gallons)~~
~~0.7 = Evapotranspiration Adjustment Factor~~
~~LA = Landscape Area (square feet)~~
~~0.3 = Additional Evapotranspiration Adjustment Factor for Special Landscape Areas~~
~~SLA = Special Landscape Area (square feet)~~

Legend for Water Budget-MAWA Calculation Formula

Symbol	Description of Symbol
ETo	Evapotranspiration (inches per year); see Table 6 or ETo Map
0.62	Conversion factor to gallons
ETAF 0.55 for residential areas; 0.45 for non-residential areas	Evapotranspiration Adjustment Factor
LA	Landscape Area (square feet)
1- ETAF 0.45 for residential areas; 0.55 for non-residential areas	Additional Evapotranspiration Adjustment Factor for Special Landscape Areas and Reclaimed Water

SLA	Special Landscape Area (square feet)

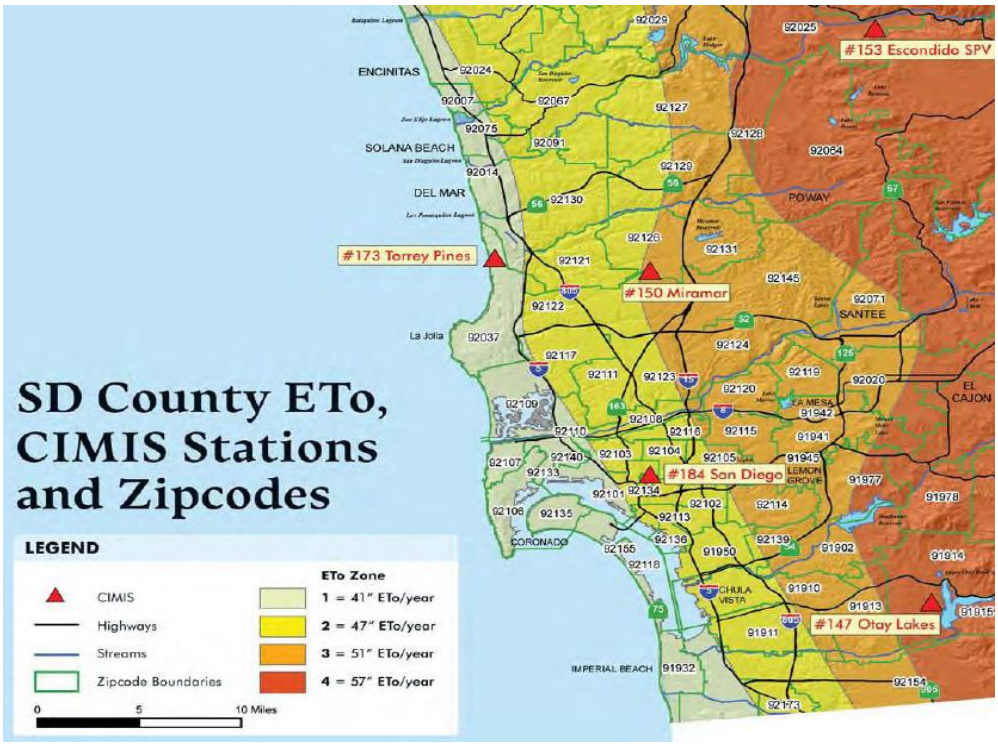
In the calculation below provide the values for the water budget calculation used for the proposed project. The ETo for the calculation may be based on the precise location of the project using the ETo Map or based on the ETo for the Community Planning Area in Table 6 of the Landscape Standards each of which follows.

~~(___)(0.62) [(0.7) (____) + (0.3)(____)] = ____ Gal./Yr.~~
~~ETo LA SLA~~

Water Budget-MAWA calculation = $(ET_0)(0.62)$ [(ETAF)(LA) + (1-ETAF)(SLA)] = gallons per year

ETo Map

Comment [a3j5]: Replace legend in this map with updated numbers per state law appendix A.



~~Table 6~~
EVAPOTRANSPIRATION (ETo) TABLE
BY COMMUNITY PLANNING AREA

Community Planning Area	Average Annual ETo (inches/year)	Community Planning Area	Average Annual ETo (inches/year)
Barrio Logan	~~41~~ 40	North City FUA Subarea II	47
Black Mountain Ranch	47	Ocean Beach	~~41~~ 40
Carmel Mountain Ranch	~~51~~ 47	Old San Diego	47
Carmel Valley	47	Otay Mesa	~~51~~ 47
Centre City	~~41~~ 40	Otay Mesa-Nestor	~~41~~ 40
City Heights	47	Pacific Beach	~~41~~ 40
Clairemont Mesa	47	Pacific Highlands Ranch	47
College Area	~~51~~ 47	Peninsula	~~41~~ 40
Del Mar Mesa	47	Rancho Bernardo	57
East Elliott	~~51~~ 47	Rancho Encantada	57
Eastern Area	~~51~~ 47	Rancho Penasquitos	~~51~~ 47
Encanto	~~51~~ 47	Sabre Springs	~~51~~ 47
Fairbanks Country Club	47	San Pasqual	~~57~~ 54
Greater Golden Hill	47	San Ysidro	47
Greater North Park	47	Serra Mesa	47
Kearney Mesa	47	Scripps Miramar Ranch	~~51~~ 47
Kensington-Talmadge	~~51~~ 47	Skyline-Paradise Hills	~~51~~ 47
La Jolla	~~41~~ 40	Southeastern San Diego	47
Linda Vista	47	Tierrasanta	~~51~~ 47
Midway-Pacific Highway Corridor	~~41~~ 40	Tijuana River Valley	~~41~~ 40
Mira Mesa	47	Torrey Highlands	47
Miramar Ranch North	~~51~~ 47	Torrey Hills	47
Mission Beach	~~41~~ 40	Torrey Pines	~~41~~ 40
Mission Valley	47	University	47
Navajo	~~51~~ 47	Uptown	47
Normal Heights	47	Via De La Valle	47

Comment [a3j6]: See MWELO Appendix A

LSCP needs to verify that my edits plugged in this table accurately reflect the state law change.

3. **DETERMINE THE ESTIMATED TOTAL WATER USE (ETWU)**

The Estimated Total Water ~~use~~ Use (ETWU) is calculated using the following formula~~:~~:

$$ETWU = [(ETo)(0.62)][\text{~~(PF x HA/IE)~~} (\frac{PF \times HA}{IE}) + SLA] = \text{gallons per year}$$

Legend for Estimated Total Water Use (ETWU) Calculation Formula

Symbol	Description of Symbol
ETo	Evapotranspiration (inches per year)
0.62	Conversion factor to gallons
PF	Plant Factor

HA	Hydrozone Area[8] ~~(~~square feet~~)~~
IE	Irrigation Efficiency (0.81 for Drip System devices) (0.75 for Overhead Spray devices)
SLA	Special Landscape Area (square feet)

~~Where:~~

~~ETo = Reference Evapotranspiration (inches)~~
~~0.62 = Conversion facto~~ factor ~~to gallons~~
~~PF = Plant Factor from WUCOLS~~
~~HA = Hydrozone Area (s.f~~ square footage~~)~~
~~IE = Irrigation Efficiency~~

~~Irrigation Method and Efficiency~~					
~~Bubblers~~	~~0.85~~	~~Fixed Spray~~	~~0.55~~	~~Rotator Spray~~	~~0.70~~
~~Drip~~	~~0.90~~	~~Micro Sprays~~	~~0.70~~	~~Rotors~~	~~0.70~~
~~Drip Irrigation~~	~~0.80~~	~~MP Rotators~~	~~0.75~~	~~Spray Heads~~	~~0.60~~

~~Plant Water Use~~	~~Plant Factor~~	~~Also includes~~
~~Low~~	~~<0.1–0.2~~	~~Artificial Turf;~~
~~Moderate~~	~~0.3 – 0.7~~	
~~High~~	~~0.8 and greater~~	~~Water features~~
~~Special Landscape Area~~	~~1.0~~	

Use the following table to ~~tack~~ track information about each controller in the system.

Comment [a3j7]: Replace tables with new calculation worksheet based on MWELO worksheet.

Controller No.	Hydrozone No.	Valve Circuit	Plant Factor (PF)	Hydrozone Area in s.f. (HA)	Irrigation Method	Irrigation Efficiency (IE)	% Total Landscape Area

[8] ~~The surface area of water features (swimming pools, spas, ponds, lakes, fountains and similar features) are included in the high water use hydrozone and the surface area of artificial turf, is included in the low water use hydrozone.~~

						Total	

Then plug in the numbers from each controller/hydrozone into the ETWU equation. Then total the gallons per year of each controller/hydrozone for the Estimated Total Water Use per year. **The total ETWU cannot exceed the total Water Budget~~-~~ MAWA.**

Controller No.	**ETWU [(ETo)(0.62)][~~(PF x HA/IE)~~ ($\frac{PF \times HA}{IE}$) + SLA]**	**Result in Gallons per Year**
	Total ETWU gallons per year	